CLAIMS

1   1.   A method of combining data to arrive at a composite graphical representation of a

2   construction site comprising, the steps of:

3   providing subsurface mapping data;

4   creating a subsurface model of subsurface features from the subsurface mapping

5   data;

6   creating a wire frame model of an above surface feature;

7   overlaying the wire frame model with a pictorial representation of the above

8   surface feature; and

9   combining the wire frame model with the subsurface model to produce the

10   composite graphical representation.

1   2.   The method of claim 1 wherein the subsurface mapping data is resistivity data.

1   3.   The method of claim 2 wherein the resistivity data is taken from an AGI

2   SuperSting program.

1   4.   The method of claim 2 further comprising the step of removing a statistical outlier

2   from the resistivity data.

1   5.   The method of claim 4 wherein a word processing program is used to remove the

2   outlier.

1   6.   The method of claim 5 wherein the word processing program is WORDPAD.

1   7.   The method of claim 2 further comprising the step of performing a least squares

2   data inversion analysis on the resistivity data.

1   8.   The method of claim 7 wherein the least squares data inversion analysis is

2   preformed by a RES3DINV program.

1   9.   The method of claim 7 wherein the least squares data inversion analysis is

2   performed by a RES2DINV program.

1   10.   The method of claim 2 further comprising the step of performing a kriging

2   analysis on the resistivity data.

1   11.   The method of claim 10 wherein the analysis is preformed by SURFER software.

1   12.   The method of claim 2 further comprising the step of performing a cokriging

2   analysis on the resistivity data.

1   13.   The method of claim 1 wherein the subsurface mapping data is ground penetrating

2   radar data.

1   14.   The method of claim 13 wherein the ground penetrating radar data is acquired

2   through a SIR-3000 ground penetrating radar system.

1   15.   The method of claim 13 wherein the data is enhanced.

1   16.   The method of claim 15 wherein the program Radan is used to enhance the data.

1   17.   The method of claim 1 wherein the subsurface mapping data is seismic data.

1   18.   The method of claim 17 wherein the seismic data is acquired from a SmartSeis

2   seismic imaging system.

1   19.   The method of claim 17 wherein the data is enhanced.

1   20.   The method of claim 19 wherein the program SizeImager is used to enhance the

2   data.

1   21.   The method of claim 1 wherein the wire frame model is created using

2   AUTOCAD software.

1   22.   The method of claim 1 wherein the wire frame model includes a model of

2   vegetation.

1   23.   The method of claim 1 wherein the wire frame model includes a model of a

2   building.

1   24.   The method of claim 1 wherein the pictorial representation is an aerial

2   photograph.

1   25.   The method of claim 24 wherein the aerial photograph is imported into

2   EVS software.

1   26.   The method of claim 1 wherein the subsurface model comprises at least

2   one 2-dimensional graph.

1   27.   The method of claim 1 wherein the subsurface model comprises at least

2   one 3-dimensional graph.

1   28.   The method of claim 1 wherein the composite graphical representation is

2   produced in Visual Reduction Modeling Language.

1   29.   The method of claim 28 wherein the graphical representation is viewed as

2   a web page.

1   30.   The method of claim 1 comprising the further step of displaying the

2   composite graphical representation.

1   31.   The method of claim 1 wherein the composite graphical representation can

2   be rotated.

1   32.   The method of claim 1 wherein the pictorial representation is a

2   representation of texture.

1   33.   The method of claim 1 including the additional step of viewing a 2-

2   dimensional slice of the composite graphical representation.

1   34.   The method of claim 1 wherein the graphical representation is used in a

2   .AVI file.

1   35.   The method of claim 1 wherein the wire frame model includes below

2   surface ground structures.

1   36.   A 3-dimensional model of a construction site comprising:

2   a graphical model of subsurface mapping data;

3   a spatial model of an above ground object; and

4   a 2-dimensional image of the above ground object superimposed on the

5   spatial model and spatially synchronized with the graphical model of resistivity data.

1   37.   The 3-dimensional model of claim 36 wherein the graphical model is

2   prepared using kriging.

1   38.   The 3-dimensional model of claim 36 wherein the spatial model is

2   prepared using AUTOCAD.

1   39.   The 3-dimensional model of claim 36 wherein the 3-dimensional model is

2   rendered in Visual Reduction Modeling Language.

1   40.   The 3-dimensional model of claim 36 wherein the subsurface mapping

2   data is resistivity data.

1   41.   The 3-dimensional model of claim 40 wherein the resistivity data includes

2   data related to moisture content.

1   42.   The 3-dimensional model of claim 40 wherein the resistivity data includes

2   data related to a void.

1   43.   The 3-dimenstional model of claim 40 wherein the resistivity data includes

2   data related to a subsurface anomaly.

1   44.   The 3-dimenstional model of claim 40 wherein the resistivity data is

2   derived through use of the equation:

3          $R = (V/I)K$;

4   where K is an electrode geometric constant;

5   R is resistance;

6   V is voltage; and

7   I is current.

1   45.   The 3-dimensional model of claim 36 wherein the subsurface mapping

2   data is ground penetrating radar data.

1   46.   The 3-dimensional model of claim 36 wherein the subsurface mapping

2   data is seismic data.

1   47.   A method of creating a graphical model comprising the steps of:

2   testing to determine subsurface mapping data;

3   enhancing the data;

4   constructing a wire frame model of an above ground structure;

5   providing a pictorial representation of a plan view of the above ground

6   structure;

7   combining the pictorial representation with the wire frame model;

8   aligning the subsurface mapping data with the combined pictorial

9   representation and wire frame model; and

10   merging the subsurface mapping data with the combined pictorial

11   representation and wire frame model.

1   48.   The method of claim 47 wherein the subsurface mapping data is resistivity

2   data.

1   49.   The method of claim 48 wherein the data is enhanced by performing a

2   least squares data inversion analysis on the subsurface mapping data.

1   50.   The method of claim 48 wherein the data is enhanced by performing a

2   kriging analysis on the subsurface mapping data.

1   51.   The method of claim 50 wherein the step of testing includes choosing a

2   placement for electrodes.

1   52.   The method of claim 50 wherein the placement is the Wenner

2   arrangement.

1   53.   The method of claim 51 wherein the placement is the Schlumberger

2   arrangement.

1   54.   The method of claim 51 wherein the placement is the dipole dipole

2   arrangement.

1   55.   The method of claim 47 wherein the step of combining is carried out with

2   AUTOCAD software.

1   56.   The method of claim 47 wherein the step of merging is carried out with

2   EVS software.

1   57.   The method of claim 47 wherein the step of merging results in a VRML

2   file.

1   58.   The method of claim 47 further comprising the step of visually displaying

2   the merged subsurface mapping data, combined pictorial representation and wire frame

3   model.

1   59.   The method of claim 58 wherein the pictorial representation can be

2   rotated.

1   60.   The method of claim 47 wherein the step of merging results in an HTML

2   file.

1   61.   The method of claim 47 wherein the subsurface mapping data is ground

2   penetrating radar data.

1   62.   The method of claim 61 wherein the program Radan is used to enhance

2   the data.

1   63.   The method of claim 47 wherein the subsurface mapping data is seismic

2   data.

1   64.   The method of claim 61 wherein the program SizeImager is used to

2   enhance the data.

1   65.   The method of claim 48 wherein the wire frame model includes below

2   ground structures.